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BRIEFER ARTICLES.

CHALAZOGAMY IN CARYA OLIVAEFORMIS.

NAWASCHIN¹ announced in 1895 that the pollen tube in *Juglans regia* does not enter the micropyle, but passes down the ovary wall and enters the ovule through the chalaza. It was not surprising, therefore, when in examining some longitudinal sections of pecan fruits I found the chalazal region of the ovules penetrated by pollen tubes. The material was gathered in the spring of 1902, a few days after the withering of the anthers. Though insufficient in amount for embryological work, for which the specimens were primarily collected, they show undoubted evidence of chalazogamy.

The general morphological character of the ovary wall and ovule resembles that of *Juglans* as described by Nawaschin. The placenta nearly fills the lower part of the ovary cavity on two opposite sides, and actually fuses with the ovary wall on the two sides lying in a plane at right angles to the first two. These two regions of fusion, lying on opposite sides of the placenta, correspond to the "flügelartige Wucherungen" of *Juglans*, and form, as do the "Wucherungen," the tissue through which the pollen tube travels to reach the base of the ovule. The single integument tightly encloses the orthotropous ovule. A micropylar canal is present, but is bent near its upper end, thus bringing its aperture into a lateral rather than apical position. No pollen tubes were found entering the canal.

The course of the fibrovascular bundles from the ovary wall to the ovule is not through the length of the placenta, but transversely through its upper part to a region immediately under the funiculus, at which point they turn abruptly upwards and pass through the chalaza into the integument. Two bundles enter in this manner from either side through the region of fusion, and then curve so as to approach each other under the funiculus in a plane approximately at right angles to that of the two regions of fusion. Such an arrangement leaves the coast clear for the direct passage of the pollen tube from the ovary wall to the funiculus.

¹NAWASCHIN, S., Ein neues Beispiel der Chalazogamie. Bot. Centralbl. 63: 353-357. 1895.

The so-called conducting tissue of the style consists of cells elongated in the direction of the long axis of the ovary, and differs in no material respect from that ordinarily seen. The pollen tube passes down the axial tissue of the style till near the cavity of the ovary, where it turns and passes down the ovary wall close to the margin of the cavity. The tissue through which it passes after leaving the style has nothing by which it could be designated "conducting tissue," but consists of nearly isodiametric cells. When a point is reached a little below the funiculus, the pollen tube curves, passes through a region of deeply-stained cells (as though mucilaginous), and when under the ovule turns upward towards the embryo sac.

While the course of the tube is not difficult to see in the ovary wall, it is particularly conspicuous as it passes through the parenchymatous cells of the chalaza and nucellus. The account of the course taken by the pollen tube, as described above, is essentially that given by Nawaschin for *Juglans*. The branching of the tube recorded by Nawaschin appears to have its counterpart in the pecan. Although I have not settled this point by a number of observations, yet I did see a distinct branching in one case, and nearly every ovule examined showed the presence of more than one tube in the nucellus. If branching occurs, it takes place after the pollen tube has entered the subfunicular tissue.

Nothing definite has been made out as to the process of fertilization, or the nature of the embryo sac, but it is hoped that additional material will reveal something of interest along these lines.—FREDERICK H. BILLINGS, *Louisiana State University*.

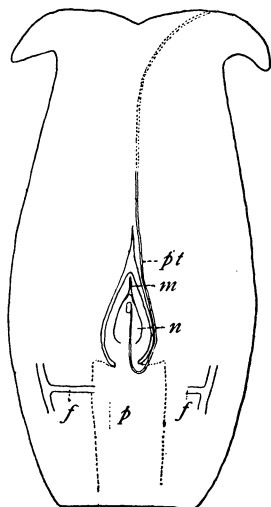


Diagram illustrating chalazogamy in the pecan: *pt*, placenta, cut in the plane of fusion with the ovary wall; the approximate lines of fusion are represented by dotted lines; *f*, fibrovascular bundles running to the ovule; *n*, nucellus; *m*, micropylar canal; *pt*, pollen tube.

SELECTED NOTES.

LEAF VARIATION IN *Liriodendron Tulipifera*.—A recent article by E. M. Berry on the phylogeny of *Liriodendron* (*BOT. GAZ.* 34: 44-63. 1902) attracted my attention to the subject of leaf variation in this